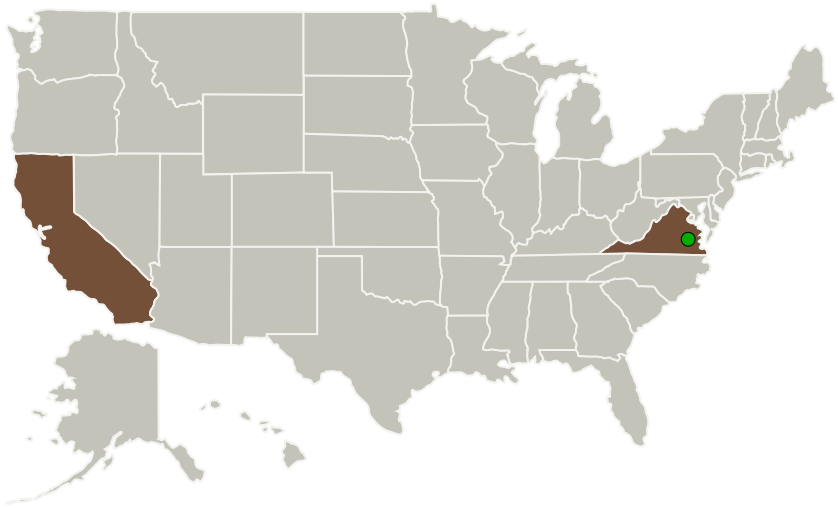
Structural Integrity Inspection and Visualization System, Phase I

Completed Technology Project (2012 - 2012)

Project Introduction

To address NASA's need for compact nondestructive evaluation (NDE) of the structural integrity of spacecraft components and structures, Physical Optics Corporation (POC) proposes to develop a new Structural Integrity Inspection and Visualization System (SIRIUS), based on acquiring two-dimensional images of Compton-scattered hard X-ray radiation produced by multiple slices of the object, with subsequent three-dimensional reconstruction of the inspected structure for high-resolution (~0.5 mm) detection and localization of defects. This approach incorporates the POC-developed innovative X-ray Compton Imaging Tomography technique (patent pending) and patented X-ray imaging optics with high spatial resolution and a wide field of view, enabling it to meet NASA's requirements for operation on a wide range of lightweight spacecraft materials, noncontact operation, portability, and ease of use. SIRIUS will provide detection and three-dimensional localization of defects and damage in space transportation vehicles, pressure vessels, ISS modules, inflatable structures, EVA suits, MMOD shields, and thermal protection structures, with spatial resolution of ~0.5 mm and penetration depth up to 25 cm (depending on the material). In Phase I POC will demonstrate the feasibility of using SIRIUS for NDE of spacecraft components by fabricating and testing a TRL-4 prototype, with the goal of achieving TRL-6 by the end of Phase II.

Primary U.S. Work Locations and Key Partners



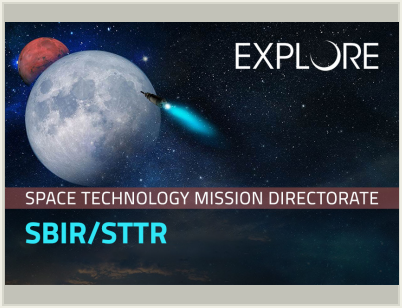


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Table of Contents

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Organizations Performing Work	Role	Type	Location
Physical Optics Corporation	Lead Organization	Industry	Torrance, California
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
California	Virginia

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138583)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Physical Optics Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

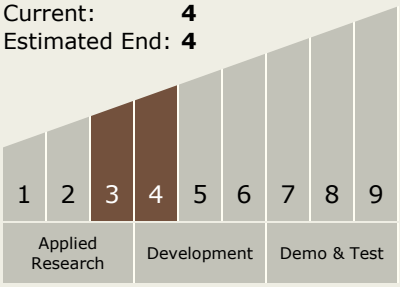
Carlos Torrez

Principal Investigator:

Victor Grubsky

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.2 Structures
    - TX12.2.1 Lightweight Concepts

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System